

BROOKHAVEN NATIONAL LABORATORY NATIONAL SYNCHROTRON LIGHT SOURCE		Number: LS-SDL-0001	Revision: B
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Subject: SOURCE DEVELOPMENT LABORATORY Conduct of Operations			
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SOURCE DEVELOPMENT LABORATORY

Conduct of Operations

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INTRODUCTION

DOE Order 5480.19

To improve the quality and uniformity of operations at the Department of Energy's facilities, the DOE issued Order [5480.19](#), "Conduct of Operations Requirements at DOE facilities." This order recognizes that the success of a facilities mission critically depends upon a high level of performance by its personnel and equipment. This performance can be severely impaired if the facility's Conduct of Operations pays inadequate attention to issues of organization, safety, health, and the environment. These guidelines are [Brookhaven National Laboratory's](#) and the Source Development Laboratory's acknowledgment of the principles of Conduct of Operations and the response to DOE Order 5480.19.

Because of the great diversity of the facilities operated by DOE and its contractors, [Order 5480.19](#) calls for "A graded approach... to assure that the depth of detail required and the magnitude of resources expended for operations are commensurate with each facilities programmatic importance and potential environmental, safety and health impact." Further, "The guidelines are written to be flexible, so that they encompass the range from large, permanent DOE test or production facilities to small research or testing facilities..." and "It is expected that facilities may use different approaches or methods than those defined in the guidelines, but facilities are expected to meet the intent of these guidelines." DOE 5480.19 does not directly address technical aspects of equipment operation as these are "...facility specific, requiring unique direction." In applying DOE Order 5480.19 to the SDL, this facility has used the "Graded Approach" to comply with the general nature of the Orders requirements.

Characteristics of the Source Development Laboratory

By 2010 or sooner, it is believed that the next major DOE light source facility will be operational, and that it will likely be based on some type of single-pass free electron laser (FEL) technology. Since the early 1990's BNL has been a key laboratory in the development of technology and theory that will support such a machine. The [Source Development Laboratory](#) (SDL) was established as a dedicated experimental platform to pursue research for this type of 'Fourth Generation' synchrotron radiation source and the science it will support.

The basic elements of the facility include a 270 MeV S-band linac with an RF photocathode gun operating at 10 Hz. A Titanium:Sapphire (Ti:Sapp) laser system provides the light to stimulate emission from the gun, and can provide light for other diagnostics and experiments. A major element of the program includes development of a high peak power FEL operating in the vacuum ultraviolet.

Known as the Deep Ultra-Violet Free Electron Laser (DUV-FEL), the objective of the program is to develop the source and experimental technology together to provide the greatest impact on UV science, and the broadest possible insight into the virtues and limitations of the technology at yet shorter (x-ray) wavelengths. The concept for the DUV-FEL is an extension of the High Gain Harmonic Generation (HG) FEL first demonstrated in the infra-red at the BNL [Accelerator Test Facility](#) (ATF).

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The basic configuration of the FEL requires a high peak current, low emittance electron beam that can be made to interact with light from a seed laser in a periodic magnetic structure (wiggler or undulator). The resulting energy modulation in the electron beam can be converted to a spatial modulation which then radiates and is amplified in a longer undulator. The radiation produced can be either at the fundamental of the seed laser (same wavelength output) or can be arranged for a higher harmonic. From the experimentalists' standpoint, the essence of the approach is to capture the properties of the high quality seed laser (stability, bandwidth, pulse duration, chirp &c) and express them at shorter wavelengths than can be obtained from laser itself. In the case of the DUV-FEL a Titanium:Sapphire system (ca 800 nm) provides the seed, and operation at wavelengths well below 200 nm are anticipated.

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OPERATIONS ORGANIZATION AND ADMINISTRATION 1

1.1 Introduction

The organization and administration of the SDL operations, is intended to achieve a high level of safety and performance, that is accomplished through effective implementation and control of operational activities. Operational policies and procedures recognize that protecting the environment, and assuring safety and efficient operations, are compatible goals. Such policies and procedures reflect the standards of excellence used in operating this facility. These policies set up the lines of responsibility for normal and emergency operations, and provide a method to monitor and assess performance. This section discusses the policies, resources, and assessment needed in operations.

1.2 Discussion

The SDL achieves a high level of excellence by having the operations management establish high levels of performance. Management communicates these standards to the SDL staff. Personnel are well trained and their performance monitored. The SDL Operations Head, establishes standards, defines goals, and determines the responsibilities of the operational staff. The operations staff provides input and feedback to standards and training. Management uses reports and goals to measure performance. Personnel are held accountable for their performance through supervisory counseling, performance appraisals, and when necessary, administrative action. Remedial training is provided, if appropriate.

1.3 Guidelines

1.3.1 Operational Policies

The overall organization of the NSLS is shown in the NSLS "[ES&H Policies and Requirements Manual](#)" (LS-ESH-PRM). Each person involved in the operation is shown and to whom that person is primarily responsible. Alternative supervision is also shown. The NSLS Chairman periodically reviews the organization chart to insure its accuracy. The organization chart reflects all modes of operation in the NSLS. The NSLS "[LS-ESH-PRM](#)" includes responsibilities for visitors, users, students and nonBNL personnel. The SDL is an operation of the NSLS, and personnel are assigned from the NSLS organization to work at the SDL.

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There are written operational procedures for all activities that could adversely impact operations safety or quality. Formal training is provided for critical or especially complex procedures. General operations training is provided through On-The-Job training, supervised by experienced personnel selected by SDL management and staff supervisors in conjunction with the NSLS Training Coordinator. Procedures and training requirements are maintained in the SDL Reference Documents and included in the NSLS Training Plan.

Visiting scientists and associates must read section 6 of the "NSLS Users' Guide", view a training video on General Employee Radiation Training (GERT) and NSLS Safety. They must pass a written examination on GERT and NSLS Safety and complete an NSLS Safety Orientation Certification Form. A radiation badge may be issued and access granted to the SDL after all of the above requirements are completed. Operational goals are defined at weekly meetings of SDL staff and users where performance objectives are set, monitored and recorded.

1.3.2 Resources

The NSLS Chairman assures that there are sufficient resources for safe and efficient operation of the SDL. The NSLS management considers long-range staffing needs and develops plans to implement them. These plans are consistent with the allotted funding and the missions of the NSLS and SDL.

SDL Machine Operators operate on a shift basis with minimal overtime. Technical staff are assigned equipment responsibilities (see NSLS Electrical System Responsibilities SLS-08.2-1-1, NSLS Mechanical System Responsibilities SLS-08.2-3-1 and SDL System Responsibilities SLS-08.2-007) and are called in to repair or service equipment as needed.

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1.3.3 Monitoring of Operating Performance

Machine and experimental operations are monitored and reviewed by the SDL project manager and SDL technical staff. All operating problems or conditions are recorded in the operators log book. Machine faults are recorded and reported in writing to the responsible engineer or technician daily.

NSLS has an ALARA program and a routine radiation monitoring system is in place, which applies to the SDL. Environmental safety and health inspections are carried out every three months, reports of which are sent to all management levels. Safety interlock inspections are completed under accordance with "[LS-ESH-PRM](#)" 1.5.3.

1.3.4 Accountability

All personnel are held accountable for their performance. NSLS management performs evaluations of all personnel to determine if problems exist. Retraining or administrative action is considered for personnel involved in significant or frequent violations of NSLS policies and/or procedures.

1.3.5 Management Training

The NSLS Training Policy, Responsibilities and Requirements are included in the NSLS Facility Manual. The NSLS management and supervisors in conjunction with the NSLS Training Coordinator determines which BNL and SDL-specific training must be given to support operational activities. The SDL management and supervisors will attend training determined by the NSLS Chairman.

1.3.6 Planning for Safety

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All operational activities are carried out under the constraints of the SDL Accelerator Safety Envelope (ASE) and the NSLS Complex “Facility Use Agreement” (FUA). All personnel are expected to understand the requirements established in these documents and to ensure their implementation in the work place. Routine work in the facility is subject to the requirements in [ESH Standard 1.3.6](#) and are administered by the SDL Work Control Coordinator. Guidelines for safety review of experimental beamlines have been established in [LS-ESH-PRM 1.3.5b](#) and a formal, documented review process is carried out for all beamlines. Individual experiments are reviewed and approved by NSLS staff via a safety approval form as established in [LS-ESH-PRM 1.3.5a](#).

SDL Operators are trained to implement NSLS policies for experimental operations. All non-NSLS experimental users view a safety video and read and sign-off on safety documentation prior to being authorized for radiation badges and access to the SDL floor.

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OPERATING PRACTICES 2

2.1 Introduction

This section describes some important aspects of routine operations and practices. [Section 3](#), Control Area Activities, and [Section 4](#), Communications, contain the related guidelines.

2.2 Discussion

Effective monitoring of equipment is necessary to detect abnormal conditions or adverse trends. Monitoring allows actions to be taken before the equipment malfunctions. Notifying the SDL Project Manager promptly of unusual or unexpected situations will help to assure that attention is given to any problems. The SDL Project Manager is responsible for SDL operations and formally transfers authority to operate to the Head of SDL Operations who decides on the response to abnormal conditions and reviews and approves any special tests. SDL personnel must follow the proper practices for industrial safety, radiological protection and quality assurance.

2.3 Guidelines

2.3.1 Status Reports

Operators must monitor the various instruments that describe the SDL status. Operators follow chapter [LS-ESH-PRM 1.1.0 "NSLS Occurrence Reporting System"](#) of the NSLS [LS-ESH-PRM](#). If the occurrence involves personnel safety, the NSLS Safety Coordinator and/or Safety Officer shall be notified.

2.3.2 Safety Practices

Operators must fulfill all ES&H requirements including that the operation is in compliance with the Accelerator Safety Envelope (ASE) and Facility Use Agreement (FUA). General ES&H requirements are given in the BNL Standards Based Management System (SBMS) [ES&H Standard](#).

2.3.3 Inspections

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Due to the open structure of the SDL and close proximity of the accelerator and experimental areas to the SDL Control Room, walking tours of the area are generally not necessary. Walk downs of the facility will occur during start-up of the machine. Regular (3 month) safety tours are carried out for all NSLS areas including the SDL, which are followed up to ensure compliance.

2.3.4 Personnel Protection

The SDL Project Manager in conjunction with the NSLS Safety Officer reviews operational practices to maintain personnel exposures to hazards "As Low As Reasonably Achievable" (ALARA). SDL has an ALARA policy in compliance with the BNL Radiological Control Manual.

The SDL Operations Head in conjunction with the NSLS Training Coordinator, determines which BNL safety courses and NSLS-specific courses operational personnel must take. BNL ESH&Q personnel assigned to the NSLS carry out routine radiation surveys and perform surveys at the request of the SDL Operations Head and NSLS Safety Staff.

There is an ongoing radiation monitoring process for the SDL using Thermoluminescence Dosimeters (TLD's) and area monitors which are read and reviewed monthly by the NSLS safety officers and BNL ESH&Q personnel attached to NSLS.

2.3.5 Response to Indicators

Operators must report and log any abnormal operations, systems or equipment failures. A fault report must be written, and affected personnel must be made aware of the potential consequences of these problems. The SDL Project Manager and Operations Head are responsible for scheduling corrective actions and notifying all effected personnel of operational problems.

2.3.6 Resetting Protective Devices

Protective devices are installed to protect personnel and equipment from operating beyond their design limits. Protective devices may only be reset after establishing the cause of exceeding the

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device limit. Corrective action by the operator or technical staff is taken and reported as needed. Major occurrences are reported and investigated as required by [LS-ESH-PRM](#) 1.1.0 "Occurrence Reporting System".

2.3.7 Authority to Operate

The NSLS Chairman gives the authority for operations to the SDL Project Manager. The SDL Project Manager gives the authority to operate to the SDL Operations Head but maintains the responsibility for all SDL operations. The Operators are responsible for operating the SDL safely and efficiently by adhering to operational procedures, Accelerator Safety Envelope (ASE), Facility Use Agreement (FUA), and NSLS quality assurance requirements. Any work by support groups which might impact the operation of the accelerators shall be approved by the on-duty Operator and the SDL Work Control Coordinator.

2.3.8 Shift Operating Base

The SDL Control Area (console) is the base of SDL accelerator operational activities.

2.3.9 Potentially Distractive Materials and Devices

The Operations Head must approve the use of computerized, written, audio, or visual material not having to do with operations.

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CONTROL AREA ACTIVITIES 3

3.1 Introduction

This section discusses the control area activities that help to achieve safe and efficient operations.

3.2 Discussion

The control area is the coordination point for all important operations. Operators should not be overburdened with administrative responsibilities. Access to the control area should be limited so that operators are not distracted from properly monitoring and adjusting facility parameters.

3.3 Guidelines

3.3.1 Access to the Control Area

The SDL Control areas have access limited to authorized personnel. The Operator on duty grants entry to the control area and has the authority to restrict access. Personnel not specifically trained and authorized are restricted from operating the controls. Students, visitors and trainees must be made aware of safe working habits before entering the control areas.

3.3.2 Professional Behavior

The Operations Head and Operators are responsible for enforcing professional behavior in the control areas. Personnel disrupting operations will be removed from the control areas. Visitors accompanied by authorized personnel will be admitted access to the control areas at the discretion of the on-duty Operator.

3.3.3 Monitoring the Main Control Panels

Operators monitor, prepare printouts and save files of the main operating parameters and also major changes in operational requirements. Operators log and respond to malfunctions and alarms according to established procedures, so that steps can be taken to correct problems.

Individual SDL equipment status is available via the operations computer terminals. All machine set points are stored in memory in the computer and can be restored or compared to the current set points. All equipment is individually protected to "failsafe" and does not depend upon computer intervention. Operators need to monitor the control console only when the machine is operating.

3.3.4 Control Area Ancillary Duties

The Operations Head is responsible for reviewing operator tasks to assure that operators are not performing duties that could interfere with the proper monitoring of operations. Operators perform administrative tasks only when operating conditions permit.

3.3.5 Operation of Control Area Equipment

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Only operators trained and authorized by the Operations Head may operate the SDL controls. A list of authorized operators is posted in the control area. New operating personnel receive operations training through a documented On-The-Job (OTJ) training program. Experienced operators supervise new operating personnel until the Operations Head formally approves their ability to operate the controls.

In addition Experiment Managers, Physicists, and Engineers may operate equipment that they have the responsibility for, and perform machine studies, in accordance with SDL Conduct of Operations and with the knowledge of the on-duty operator.

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COMMUNICATIONS 4

4.1 Introduction

Communications should be reliable and accurate when transmitting information within the SDL, Communications systems are designed to insure that information is readily accessible to SDL staff and users.

4.2 Discussion

Oral and computer communications are the primary means of sending operations information. Since accurate communication is essential for safe and efficient operation, guidance in its use is necessary. Operators use the facility audio and visual warning devices to alert personnel to abnormal or emergency conditions. These communications are controlled, to insure that they do not detract from normal operations and are available in an emergency. Specific information on communication procedures must be given to outside users.

4.3 Guidelines

4.3.1 Emergency Communications Systems

The SDL has a BNL telephone system to contact BNL emergency response personnel. The emergency number is extension 2222 or 911 and is posted in the control areas. The backup system for emergency response is through activation of the manual fire-alarm stations. Communication systems are tested to insure they are functional.

The SDL on-duty operator is the "Local Emergency Coordinator" for the SDL facility. The BNL "Plectron Warning System" sounds and gives information on BNL emergencies, evacuations, weather alerts, etc. This system is operated by the BNL Safeguards and Security Division.

The automatic fire alarm system sounds warning bells in all SDL areas in the event of an emergency requiring an emergency evacuation. This system can be activated manually. A public address system is used by the operator to reinforce the evacuation. The Plectron Warning System, fire alarms and the PA system are tested periodically.

4.3.2 Public Address Systems

A public address system is used to give information regarding machine operations. It can be accessed from any telephone on the BNL site at extension 646. Excessive use of the PA system for contacting department personnel and unnecessary announcements should be avoided.

For normal communications, pocket pagers, facility telephones and E-mail are used.

4.1.1 4.3.3 Contacting Operators

Staff normally contact Operators by the facility telephone. The SDL Operators extension is 5353. Portable radios are utilized by the Operators to maintain contact with the control area and each other when necessary. Emergency information is relayed to the control room via the BNL "Plectron Warning System".

4.3.4 Radios

Portable radios are used throughout the SDL by the operations staff to maintain contact with the control room and each other. Channel F1 is dedicated to operations, channel F2 is used by other groups.

4.3.5 Abbreviations and Acronyms

Operators should use only commonly known abbreviations and acronyms in communications, these include equipment names as designated in the computer data base.

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4.3.6 Oral Instructions and Information Communication

Oral instructions should be clear and concise, and the sender and intended receiver should be readily identifiable. Instructions involving the operation of equipment, should be repeated by the receiver when necessary to insure that the instructions are understood.

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The primary mode of training for operating the SDL is through on-the-job training. Training must be carefully supervised and controlled to avoid mistakes in operations. This chapter discusses the SDL's training requirements.

5.2 Discussion

On-the-job training, is that part of the training in which the trainee receives hands-on experience with the SDL controls and equipment. Experienced operations personnel supervise this instruction. The Operations Head, in conjunction with the NSLS Training Coordinator, is responsible for determining the training methods, materials, and documentation according to BNL training policies and standards.

5.3 Guidelines

5.3.1 Adherence to Training Program

The Operations Head, in conjunction with the NSLS Training Coordinator, determines the training requirements, duration of training and when an operator is qualified to operate the SDL without direct supervision. In addition, a checklist shall be used to assure completion of training requirements.

Trainees are required to familiarize themselves with the SDL reference documents, SDL systems, policies and procedures. The Operations Head selects which SDL-specific, BNL-wide, or other training programs personnel must attend to be qualified to operate or use the facility. The Operations Head may authorize training exemptions based on an assessment of personnel experience.

5.3.2 On-Shift Instructor Qualifications

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The SDL Operations Head, authorized by the NSLS Chairman, has the authority to operate the SDL. The Operations Head determines who is qualified to instruct the trainees.

5.3.3 Qualified Operator Supervision and Control of Trainees

Qualified operators supervise training whenever trainees operate equipment, insuring that errors are not made that could degrade SDL safety or operation. Information recorded by trainees is reviewed by qualified Operators.

5.3.4 Operator Qualification Program

[BNL Training Policy, Standards and Guidelines](#) require that the SDL provide a statement of training requirements by functional job, and facility and work location. The Operator Qualification Program shall be approved by the SDL Operations Head. The NSLS Training Coordinator and the Operations Head shall coordinate any changes in the program.

5.3.5 Training Documentation

Training will be documented by the NSLS Training Coordinator.

5.3.6 Suspension of Training

Training shall be immediately suspended in the event of an abnormal occurrence or emergency condition.

5.3.7 Maximum Number of Trainees

There shall be no more than two new Operator trainees on any given shift.

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5.3.8 Use of Trainees to Support Operations

The Operations Head decides when an operator trainee, under normal operating conditions, is permitted to perform certain procedures by himself/herself.

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6.1 Introduction

BNL's policy for investigating and reporting abnormal events is defined in BNL SBMS ES&H Standards, 1.1.0, "[Occurrence Reporting System](#)". The objectives of this program are:

- ◆ That abnormal events (Emergency, Unusual and Off-Normal occurrences and Near-Miss situations) are thoroughly investigated to assess their impacts on operations.
- ◆ That occurrences meeting certain criteria are promptly reported to BNL and DOE management.
- ◆ That root causes are identified.
- ◆ That corrective actions are identified and taken to prevent recurrence

6.2 Discussion

This facility has formal training to assure that abnormal events (occurrences) are recognized, reported, investigated, and corrected. These events can be created by both BNL employees and outside users. All persons must be made aware of what is an abnormal event and what actions must be taken when they occur.

Abnormal events are occurrences that could:

- ◆ Affect the health and safety of the public, employees or guests.
- ◆ Have an adverse effect on the environment.
- ◆ Affect the operations and intended purpose of the SDL.
- ◆ Result in loss or damage to property.

6.3 Guidelines

6.3.1 Events Requiring Investigation

ES&H "Policies and Requirements Manual" ([LS-ESH-PRM](#)), Chapter 1.1.0 "[NSLS Occurrence Reporting System](#)" covers criteria for when to perform an investigation.

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[LS-ESH-PRM](#) Chapter 1.1.0 section 8.0 lists specific events requiring an investigation. BNL SBMS ES&H Standard 1.1.0 "Occurrence Reporting System" section 8.8.2, lists criteria for "near miss", emergency, unusual or off-normal conditions.

6.3.2 Investigation Responsibilities

Staff appointed by the NSLS Chairman shall act as Facility Managers for the NSLS Department. These people are listed in the BNL SEAPPM 1.1.0 and are also posted in the NSLS Control Room.

6.3.3 Investigator Qualifications

The NSLS Chairman in conjunction with the Operations Head is responsible for appointing knowledgeable persons from the NSLS staff and BNL staff safety professionals to investigate events.

BNL staff members from the ESH&Q Division, and Laboratory Operations Support Office are available to assist in investigations.

6.3.4 Information to be Gathered

NSLS personnel and/or others requested by the NSLS Chair, together with the professional staff of the BNL ESH&Q Division will collect all necessary information to complete an investigation of an event. This information should include the initial condition of the facility, statements of Operators and other personnel, logs and other pertinent documents.

6.3.5 Event Investigation

Investigations of events shall follow the approved format specified in BNL SBMS ES&H Standards, 1.1.0 "[Occurrence Reporting System](#)".

6.3.6 Investigative Report

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The investigative report shall follow the approved format specified in BNL SBMS ES&H Standards Manual, 1.1.0 "[Occurrence Reporting System](#)".

6.3.7 Event Training

Information collected by NSLS personnel and by BNL ESH&Q will be used for "lessons-learned" feedback to SDL personnel, so that operations, maintenance and training can be improved.

NSLS Safety officers and Operational personnel develop and carry out drills dealing with emergency situations that might reasonably be expected to occur during SDL operations.

6.3.8 Event Trending

The Program Review Office of the BNL ESH&Q Division, tracks all occurrences and issues reports to NSLS Safety personnel for review and analysis.

6.3.9 Sabotage

NSLS [LS-ESH-PRM](#) chapter 1.1.0, section 8.5, provides guidance on Sabotage under the heading of Criminal Acts. The SDL Operations staff will immediately report any suspected sabotage to the BNL Safeguards and Security Division.

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NOTIFICATIONS 7

7.1 Introduction

NSLS management and DOE must be notified promptly of abnormal occurrences to assure that the Laboratory is responsive to public health and safety concerns. This section provides guidance to assure the uniformity, efficiency and completeness of these notifications according to the requirements of BNL SBMS ES&H Standards, 1.1.0 "[Occurrence Reporting System](#)."

7.2 Description

Some abnormal events depending on their seriousness, require verbal notification within 15 minutes of categorization as "Emergency Occurrences", and within 2 hours of categorization as "Unusual Occurrences". No verbal notification is required for Off-Normal Occurrences. All DOE reportable events require a written report to DOE management within 24 hours of categorization.

7.3 Guidelines

7.3.1 Notification Procedures

A Notification Call List for occurrences, which includes the Facility Manager and alternates together with their telephone numbers is posted in the SDL control area.

SBMS ES&H Standards 1.1.0, "[Occurrence Reporting System](#)" identifies the events and conditions requiring notification, together with notification time requirements.

The NSLS Local Emergency Plan is maintained in the NSLS Facility Manual, and describes notification procedures in the event of an emergency.

The on-duty Operator normally decides when to activate an equipment responsibilities call-in list.

7.3.2 Notification Responsibility

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The SDL Operations Head is responsible to ensure that those individuals listed on the appropriate call-in list have indeed been notified and that any requirements for notification have been satisfied.

7.3.3 Names and Phone Numbers

The names and phone numbers of the SDL Project Manager and alternates are posted in the SDL control areas.

The names and phone numbers of NSLS personnel required to be notified in the event of an emergency are listed in the NSLS Emergency Plan.

Equipment responsibilities call-in lists are maintained in the SDL control area. They are broken down by equipment grouping, and contain names of primary and alternative personnel, phone numbers and pager numbers.

7.3.4 Documentation

The BNL Program Review Office of the ESH&Q Division maintains a central file of BNL Occurrence Reports.

The ESH&Q Division documents all hazardous oil or chemical spills and/or radiological airborne emissions and notifies the appropriate Local and State authorities.

The on-duty Operator logs all abnormal conditions or problems.

7.3.5 Communication Equipment

The on-duty Operator will use the BNL telephone system to notify NSLS management of an occurrence. The SDL Project Manager or designated alternates will notify the ESH&Q Program Review Office by telephone and DOE through the established network.

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CONTROL OF EQUIPMENT AND SYSTEM STATUS 8

8.1 Introduction

Good operating practices will maintain the SDL's configuration within its design limits and provide the Operators with knowledge of the status of the equipment and systems.

8.2 Description

SDL Operators must be aware of how the equipment and systems function. Operators also must be aware of operational safety and reliability limits. Changes in equipment and system configuration must be communicated to the affected operating personnel, by noting these changes in the operations logbook(s), or by using other methods to allow Operators to review the changes.

The status of the equipment and systems is controlled according to NSLS procedures, which includes ensuring compliance with operational safety limits before changes are made to operational modes, including the removal or restoration of equipment to service. Identification and documentation of equipment deficiencies is important to assure safe and reliable operation.

8.3 Guidelines

8.3.1 Status Change Authorization and Reporting

Modifications meeting the criteria specified in BNL ES&H Standard Manual 1.3.2 "[Operational Readiness Review](#)" shall be submitted for formal Operational Readiness evaluation.

Changes to major equipment and systems shall be via a NSLS documented review.

Non-safety operational changes may be authorized by the Operations Head or Project Manager. Equipment group personnel must notify the on-duty Operator of any equipment changes that may effect the performance of the SDL. Operators insure that changes in the SDL configuration

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and status are communicated to all operations personnel and must document those changes in the SDL operations log.

The configuration of experiments is reviewed and documented by the NSLS Beamline Review Committee. The Beamline Review Committee works with the ES&H committee and the Safety Officer, reporting to the NSLS Associate Chairman.

The NSLS Safety Officer reviews each experiment configuration when its installation is completed before permission to operate is granted. Individual experiments are all reviewed prior to operation via a Safety Approval Form review.

8.3.2 Equipment and Systems Check

Equipment operational checks are carried out after shutdowns for maintenance or repairs. These tests ensure operation at design levels. Checklists are used as needed or appropriate. The SDL Project Manager is responsible for insuring adequate commissioning time and training after equipment or system changes.

The Operator and NSLS Safety Officer exercise configuration control on the SDL through intervention and oversight. Work on SDL equipment necessitating a lock-out condition, may require the completion of a detailed Checklist before the equipment is enabled.

Work on the SDL accelerator hardware or interlocks requires a lock-out and the completion of an NSLS Work Permit and if required, an interlock test. An interlock test must be completed if the integrity of the interlock system has been changed. A checklist is used to record the results of the tests.

8.3.3 Equipment Locking and Tagging

All operations personnel shall have training on [LS-ESH-PRM 1.5.1 "Lockout/Tagout Requirements"](#). Special locks and tags are available in the SDL Control Area. Use of locks and

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tags are recorded in a log book maintained in the control area, this log shall be audited on a regular basis.

8.3.4 Operational Limits Compliance

All SDL equipment is designed to be self limiting, and as such cannot cause a safety hazard or equipment damage. However, to operate within the design parameters of the SDL Safety Assessment Document, and also to keep radiation exposures "As Low As Reasonably Achievable" (ALARA) an Accelerator Safety Envelope has been established and is posted in the SDL Control Room. The on-duty Operator is responsible for maintaining these operational limits.

8.3.5 Equipment Deficiency Identification and Documentation

Equipment and system faults are noted in the operations log and are reported to the responsible system group for repair by the appropriate specialist. When the SDL is operating, faults are reported and reviewed at the weekly SDL operations meeting.

8.3.6 Work Authorization and Documentation

Maintenance and equipment upgrades are planned on a monthly basis, work schedules are drawn up and approved by the SDL Project Manager. These schedules are posted in the SDL Control Areas.

Experiments operate under the limits imposed by the [Safety Approval Form](#), signed by the Safety Officer. The NSLS work permit program is used to monitor and control all work in progress on experiments that may affect safety.

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The NSLS Work Permit Program is used to monitor and control all work in progress on the SDL machine that may affect the safety of its operation.

8.3.7 Equipment Post-Maintenance Testing and Return to Service

Post-maintenance equipment checks are performed by the responsible equipment groups prior to operational startup by the on-duty Operator. These checks ensure that the startup is performed in an efficient manner and the SDL may operate at its design levels.

The on-duty Operator checks and records certain operational outputs versus equipment set points as part of the machine turn-on procedure. Computer "Save and Restore" programs are used to set the machine parameters to a baseline configuration and other programs check equipment for errors.

Following any work on the safety system the entire system is rigorously functionally tested and documented by the Safety Officer.

Work which may affect machine configuration is monitored by the work permit system and the equipment checklists. They are revised and approved prior to restart.

8.3.8 Alarm Status

Operators are trained to respond to all SDL equipment and system alarms. After establishing and/or correcting the cause, the Operator or responsible technician may reset equipment alarms.

The Fire alarm status is latched at the display panel, and at the BNL firehouse. The Operators are trained in the NSLS Emergency Plan.

SDL experiments may have safety system hardware which display the system status. Faults are latched and indicated by lights, requiring review and resetting by the safety personnel according to a detailed procedure.

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8.3.10 Temporary Modification Control

Temporary modifications must be approved by the Operations Head and/or Project Manager. They shall be logged in the operations log book(s) by the on-duty Operator. All modifications to safety systems must be approved and documented by the NSLS Safety Officer.

Updated operating procedures must be documented and reviewed by the on-duty Operator.

8.3.11 Distribution and Control of Equipment and System Documents

The SDL Master File maintained in the NSLS Design Room contains the latest design documents including drawings and specifications, design review documents, procurement and incoming test documents, and non-conforming material control documents.

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LOCKOUTS AND TAGOUTS 9

9.1 Introduction

This section provides a method to control equipment through tagging and/or locking. These actions protect personnel from injury and protect equipment from damage. Accidental operation of equipment during normal operation, servicing, or maintenance activities has the potential to cause personal injury, or equipment damage. The Lockout/Tagout program allows workers to be sure that equipment has been removed from service and later restored to operation.

9.2 Discussion

Tagout is the application of a warning tag on an energy-isolating device. Tagout shows that the energy-operating device and the equipment it controls must not be operated. Lockout is the placement of a lock or similar mechanism on an energy-isolating device. The SDL shall perform Lockout/Tagout according to [LS-ESH-PRM](#) Standards 1.5.1 "[Lockout/tagout Requirements](#)". Personnel who perform Lockout/Tagout shall be trained in these requirements and the specific requirements of the SDL.

9.3 Guidelines

9.3.1 Lockout/Tagout

[LS-ESH-PRM](#) 1.5.1. "[Lockout/tagout Requirements](#)" provides guidance on the use of Lockout and Tagout devices.

Personnel working at the SDL shall use Lockout and Tagout devices to isolate energy sources when required. Locks and tags are available from the SDL Control Area, where use is logged and audited. Only those individuals trained in the use of lockout/tagout, are allowed to implement lockout procedures.

9.3.2 Testing or Positioning of Equipment or Components

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Testing or positioning of equipment at the SDL shall be accomplished only by authorized and trained personnel.

9.3.3 Periodic Inspections

The SDL Operations Head or his designee shall audit the lockout/tagout logbook and outstanding tags. Records will be made available to BNL and DOE auditors.

9.3.4 Caution Tags

Yellow Caution tags are used at the SDL to convey information about the status of equipment and to prevent equipment damage, where equipment damage is not a personnel hazard. Standard BNL red tags must be used in all personnel safety lockouts. Standard red and yellow caution tags are available in the SDL Control Area.

9.3.5 Training and Communication

[LS-ESH-PRM](#) 1.5.1 Section 2, "Training Department Certification, establishes the requirements of department training programs for Lockout/Tagout.

[BNL Training Policy, Standards and Guidelines](#) apply to all training provided by the Laboratory, Departments, Divisions and facilities, including classroom instruction and on-the-job training.

The SDL Operations Head in conjunction with the NSLS Training Coordinator is responsible for training SDL personnel in the requirements of the lockout/tagout program as specified in the NSLS Training Plan. The NSLS Training Coordinator maintains lockout/tagout training records and certifications.

9.3.6 Notification of Personnel

[LS-ESH-PRM](#) 1.5.1. "[Lockout/tagout Requirements](#)" establishes generic notification requirements.

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Lockout of equipment affecting the performance of the SDL must be with the knowledge of the on-duty Operator.

9.3.7 Outside Contractors

[LS-ESH-PRM](#) 1.5.1. "[Lockout/tagout Requirements](#)" establishes the responsibilities of Visitors, Contract employees and their BNL coordinates.

9.3.8 Group Lockouts

[LS-ESH-PRM](#) 1.5.1. "[Lockout/tagout Requirements](#)" establishes generic group lockout requirements.

9.3.9 Shift or Personnel Changes

[LS-ESH-PRM](#) 1.5.1. "[Lockout/tagout Requirements](#)" establishes generic shift and personnel change procedures for lockout/tagout.

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INDEPENDENT VERIFICATION 10

10.1 Introduction

The independent verification program provides a high degree of reliability in the SDL operation. This section describes the important aspects of this program. Other control programs for equipment status are given in [Section 8, Control of Equipment and System Status](#), and some applications of independent verification are discussed in [Section 9, Lockouts and Tagouts](#).

10.2 Discussion

Independent verification is the act of checking that a given operation conforms to established operating criteria, as well as checking a components status independently of activities related to establishing the components position. The independent verification program identifies critical components, establishes when independent verification is required, and describes the methods for performing independent verification. Not all components require independent verification because the possibility of improper status may be remote or its effect would not be significant to safe and efficient operation.

10.3 Guidelines

10.3.1 Components Requiring Independent Verification

Systems that present significant personnel hazards (flammable gas, large cryogenic systems, large stored energy systems, radiation shielding, etc.) are reviewed by the SDL Project Manager, SDL Operations Head and, as appropriate, NSLS Operations Group Section Head, Engineering Heads, NSLS Safety Committee, Interlock Committee or Beamline Review Committee prior to installation, and are inspected and authorized for operation by the NSLS Safety Officer, after any modifications or extended shutdown.

The general criteria in deciding if independent verification is warranted are as follows:

- A Could improper equipment status affect the safety or health of personnel.
- B Could improper equipment status affect the environment.

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- C Could improper equipment status significantly affect the NSLS performance or cause program loss.
- D Would improper equipment status be recognized immediately by an operator.
- E Could significant exposure to radiation or other hazardous substances be received by the person(s) performing the independent verification.

10.3.2 Occasions Requiring Independent Verification

Safety systems are checked and authorized by the NSLS Safety Officer after any modification or extended shutdown. SDL safety systems are checked and re-authorized by the NSLS Safety Officer on a 6 month basis.

Equipment turn on and performance checks are performed by the responsible technical group personnel, after extended shutdowns and prior to machine startup by the on-duty operator.

10.3.3 Verification Techniques

Operators and SDL technical staff are trained in the techniques for verifying the status of all SDL equipment.

SDL devices are continuously verified by computer applications programs, software and hardware limits and alarms.

Personnel safety systems have independent hardware and logic to verify that they are in the proper state.

Search and secure procedures, verify that personnel are out of "secured" areas prior to machine startup. The correct procedure is enforced by the safety system logic, which will not allow the safety system "ring secured" reset, if the incorrect procedure is used. Redundant door switches monitor access door positions.

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Equipment damage protection is verified by means of independent interlocks (for example temperature and water flow).

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LOGKEEPING 11

11.1 Introduction

Operations records contain a narrative log of the SDL status, and of all events required to reconstruct a history of operations. In this context, logs are defined as a narrative sequence of events or functions performed by the operations staff.

11.2 Discussion

Operation logs are established to record the data necessary to provide a history of SDL operations. The scope, type, and amount of data required by management is entered into the logs, including documentation of actions taken, activities completed, and data necessary to reconstruct events. Logs are reviewed to insure they are adequately maintained and that operations personnel are aware of the information in the logs.

11.3 Guidelines

11.3.1 Establishment of Operating Logs

The SDL operations logs are maintained in the SDL Control Area. Entries are made only by SDL Operators and Operator trainees.

11.3.2 Timeliness of Recordings

Information is entered promptly or as soon as reasonably possible to prevent inaccuracies. Logkeeping does not take precedence over controlling and monitoring the SDL.

11.3.3 Information to be Recorded

All information pertaining to the safe and efficient operation of the SDL is recorded in the operations logbooks. To aid in reconstructing events, as much information as possible is logged during emergencies and abnormal or unexpected events.

Minimum information required:

- ◆ Machine modes (e.g. operations, shutdown, maintenance, system contents, etc.)

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- ◆ Changes in SDL operating mode or condition.
- ◆ Record of critical data.
- ◆ Abnormal facility configurations.
- ◆ Status changes in safety-related or important equipment.
- ◆ Occurrences of reportable events.
- ◆ Initiation and completion of tests or studies.
- ◆ Security, Medical and Fire incidents.
- ◆ Shift reliefs and call-ins.

11.3.4 Legibility

All log entries must be legible, understandable, and made in pen of a color that can be photocopied.

11.1.1 11.3.5 Corrections

Incorrect entries are scored with a single line and initialed. Reference to incorrect entries are made in the shift summary.

11.3.6 Log Review

The operations log book is reviewed by the Operations Head.

11.3.7 Care and Keeping of Logs

The Operators Head has the responsibility for filing and storing the logs for the expected life of the facility. Back-logs are available for review by Operators or staff returning after an absence.

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OPERATIONS TURNOVER 12

12.1 Introduction

Operations turnover provides oncoming operators with an accurate picture of the overall status of the SDL. This section compliments the guidelines of [Section 2, Operating Practices](#), and [Section 3, Control Area Activities](#), and describes the important aspects of good operations turnover.

12.2 Discussion

Operations turnover is a critical part of the SDL's operation. Inaccurate or improper (incomplete) shift turnover can contribute to, or cause safety incidents, so it is essential that operations personnel perform shift turnovers such that an effective transfer of information takes place. Personnel shall not assume operational duties unless they are physically and mentally fit to do so, and until they and the off-going personnel have a high degree of confidence that an appropriate information transfer has taken place.

Oncoming personnel shall review the written (logs, records) and visual (TV displays, oscilloscopes, computer pages and alarm pages) information and receive a verbal briefing before assuming the responsibility of operating the SDL. Appropriate shift-overlap time must be allowed to accomplish proper information transfer.

12.3 Guidelines

12.3.1 Turnover Checklists

Computer "Save and Restore" files are used to store all machine parameters and are used in place of shift checklists. The on-coming Operator will familiarize himself/herself with the current save and restore files. In addition, each shift logs files used and changes in parameters

12.3.2 Document Review

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Oncoming Operators use the first several minutes of the shift scanning various TV displays, alarm displays, computer pages and reading the on-going log to familiarize themselves with the current operating conditions.

12.3.3 Control Panel Walkdown

As part of operator take-over, the on-coming Operator reviews the machine status and previous operational history displayed on TV monitors in the control area.

12.3.4 Discussion and Exchange of Responsibility

Before taking responsibility for operating the SDL, the on-coming Operation staff will view current operational status with the out-going Operation staff to ensure that they are fully cognizant of the operating conditions. The Operation staff will then sign in the log.

12.3.5 Shift Crew Briefing

The on-coming Machine Operation staff is given a verbal briefing by the out-going staff, covering what has occurred since they were last on shift. In addition, the on-coming Operation staff will review and sign the log.

12.3.6 Reliefs Occurring During the Shift

The on-duty Operator may be relieved by the Operations Head or a qualified Operator cognizant with the operating conditions of the facility.

The on-coming Operator is given a verbal briefing by the out-going Operator when a relief occurs during the shift.

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OPERATIONS ASPECTS OF SDL PROCESS CONTROL 13

13.1 Introduction

This section discusses the importance of process control systems when used as part of SDL operations.

13.2 Discussion

Process control operations must be understood by the Operators. They also must understand and maintain the safe handling of chemicals and gases.

13.3 Guidelines

13.3.1 Operator Responsibilities

The Operation staff have the responsibility for safety on the SDL floor and are trained to monitor machine and experimental systems and respond to adverse situations in those systems.

13.3.2 Operator Knowledge

Training of the Operations staff is accomplished through formal BNL and NSLS training in HAZCOM, GERT, and Materials Handling. In addition on-the-job training takes place for machine support systems, hazardous waste control, liquid nitrogen system operation, etc. Training is documented and recorded by the NSLS Training Coordinator.

13.3.3 Operator Response to Process Problems

SDL Operators and Operations staff are trained to make appropriate responses to unusual events or problems. The response may be following specific procedures, shutting down systems or equipment. If necessary, additional expert assistance is obtained through a call-in list. These events are logged in the operations log in the SDL Control Area.

13.3.4 Communication Between Operators and Process Personnel

Fault reports are generated by the on-duty operator and sent to the appropriate supervisor or engineer whenever there is an equipment or system failure. Weekly meetings provide the forum for reporting and analyzing the situations that have arisen.

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REQUIRED READING 14

14.1 Introduction

A file of required reading for operations personnel should assure that appropriate individuals are aware of the important information related to job assignments. This section describes such a required reading program.

14.2 Discussion

SDL operations personnel receive important information from the Operations Head who is responsible for distribution of information to the operators.

14.3 Guidelines

14.3.1 File Index

A list of documents maintained in the Operator required reading file include:

- ◆ The operational logs.
- ◆ The [SDL Conduct of Operations](#).
- ◆ The NSLS ES&H Policies and Requirements Manual (PRM) [LS-ESH-PRM](#).
- ◆ Safety requirements (i.e. Emergency Plan - Bldg. 729, Response to emergencies at the NSLS, NSLS policies and procedures).
- ◆ Operational Bulletins (containing changes in operational procedures and equipment).
- ◆ Operational schedules, maintenance and studies schedules.
- ◆ The SDL operational procedures.

14.3.2 Reading Assignments

Reading assignments are given to the Operators staff by the Operations Head. Certain assignments require signatures by the Operations staff to indicate that they have read and understood the document.

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14.3.3 Required Dates for Completion of Reading

The Operation logs must be read by the on-coming shift before relief of the out-going personnel.

Operational Bulletins, information pertaining to operational schedules or changes must be read by the on-coming Operations staff such that they are fully cognizant with the status of the SDL before taking over the shift.

14.3.4 Documentation

The operations logs must be signed by the on-coming shift personnel after they have read and understood the content.

Certain Operation information documents, and training notes, must be signed by Operations staff indicating that they have read and understood the content.

The Operations Head assigns required reading to the Operations staff. A record is kept of all completed reading assignments.

14.3.5 Review

Periodic reviews of required reading will be made by the Operations Head to ensure that only relevant and up-to-date information is available.

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TIMELY ORDERS TO OPERATORS 15

15.1 Introduction

There shall be a means for SDL management to communicate short-term information and administrative instructions to operations personnel. Other ways of directing Operations personnel are discussed in [Section 16, Operations Procedures](#), and [Section 17, Operator Aid Postings](#).

15.2 Discussion

The changing requirements of SDL operations require that there is a program to quickly issue information to operations personnel.

15.3 Guidelines

15.3.1 Content and Format

Special information required on a particular shift is written in the log(s) or issued as a bulletin by the Operators Supervisor and verbally emphasized during briefing. Operational changes that are expected to become permanent are implemented as soon as possible in the applications software or Facilities Manual. All short-term orders are to be clearly written, dated and properly maintained.

Operations schedules, schedule changes and other operational information are posted in the Control Areas.

15.3.2 Issuing, Segregating and Reviewing Orders

Shift orders are given to the Operations staff by the Operations Head. Occasionally special instructions are given to the operators by the Project Manager. However, these special instructions have the prior approval of the Operations Supervisor.

15.3.3 Removal of Orders

The Operators Head is responsible for canceling and removing orders that are no longer applicable. The Operations Head periodically reviews operations bulletins and postings to assure that they are current.

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OPERATIONS PROCEDURES 16

16.1 Introduction

Operations procedures provide specific direction for operating systems and equipment during normal, postulated abnormal and emergency conditions. This section describes the important aspects of the development and use of operations procedures.

16.2 Discussion

Procedures are a key factor affecting the Operations staff performance. Operations procedures should be sufficiently detailed so that the required actions can be undertaken without direct supervision. The format may range from detailed step-by-step instructions to general operating guidelines or outlines based on complexity and risk. In all cases, procedures should be written so they can be easily used without making mistakes. To insure that procedures are effective and the best possible instruction is provided, procedures should receive periodic review and feedback.

16.3 Guidelines

16.3.1 Procedure Development

Procedures exist for all normal operations, postulated abnormal and emergency situations. The detail used in the procedures is based on the complexity of the task, the experience and training of the Operations staff, the frequency of performance and the significance of the consequences of errors. Therefore, procedures can range from step-by-step instruction to general operating guidance.

Most SDL machine operating procedures are enforced by the computer software applications programs. Needed applications are either developed by the SDL Operations staff or a request is generated by the Operations Head or Project Manager to the Computer Systems Group for the required software.

Safety and emergency procedures are developed by NSLS and BNL safety personnel.

16.3.2 Procedure Content

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To provide uniformity in operations procedures, SDL procedures conform to the following guidelines:

- A The scope and purpose are clearly defined.
- B To enhance rapid retrieval, emergency procedures are kept separate from normal operations procedures and are distinguishable by the use of a Red colored binder.
- C Procedures include information from source documents, such as the SDL Safety Assessment Document and SDL Machine Operating Limits (posted in the SDL Control Areas). Procedures are dated, when originated or revised, and signed by the Operations Head, or Project Manager and the writer.
- D Warnings, notes and cautions are easily identifiable (printed in bold) and appear on the same page as the step to which they apply.

16.3.3 Procedure Changes and Revisions

Changes and revisions to procedures are made to reflect current operating practices and requirements. Minor changes to procedures may be hand written and are written on existing procedures without changing the revision level. These changes are approved, initialed and dated by the Operations Head.

Safety and emergency procedures are periodically reviewed (at least annually) by the NSLS Safety Officer to determine if changes are required.

The [BNL ES&H Standards Manual](#) and the NSLS "[ESH-PRM](#)" are controlled documents. Web based manuals are either in place or being developed that will be the official sources of current information.

Operational procedure changes or revisions are noted in the operations log(s). Operations staff are briefed on their content and importance.

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16.3.4 Procedure Approval

To ensure accuracy and practicality, operations procedures are reviewed and approved by the Operations Head and/or Project Manager before issuance.

Revisions to the operations procedures receive the same level of approval as the initial versions.

16.3.5 Procedure Review

Safety and/or emergency procedures, are reviewed by BNL and/or NSLS safety personnel to insure that all aspects of safety and environmental impact have been fully covered before issuance.

Safety and/or emergency procedures are periodically reviewed by the NSLS Safety Officer to ensure they are accurate and up-to-date.

Operational procedures, bulletins, postings, computer applications programs and files are periodically reviewed by the Operators Head to insure that they are accurate and current.

Applicable procedures are reviewed after any abnormal event to ensure their adequacy.

16.3.6 Procedure Availability

The BNL SBMS system assures that current [ES&H Standards](#) are available. SDL Procedures are maintained on the SDL web page. Up-to-date hard copies of the procedures are available at SDL. Up-to-date emergency and operational procedures are maintained in the SDL Control Area.

Operational applications programs for all areas of the SDL are available at the operators console and at other conveniently located computer terminals throughout the SDL.

16.3.7 Procedure Use

SDL operations are conducted according to procedures that reflect the requirements of an experimental research facility and are carried out in a safe and efficient manner.

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Operations staff take whatever action is necessary during emergency conditions to make the facility safe and to protect personnel, public safety and equipment. These actions are based on training and Operations staff knowledge. Operations staff need not look up emergency procedures when taking immediate actions in emergency situations, but the procedures must be readily available during and after an occurrence to validate the action.

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OPERATOR AID POSTING 17

17.1 Introduction

Operator aids should provide information to Operators in performing their duties. An operator aid program should be established to insure that the operator aids posted are current, correct and useful.

17.2 Discussion

Operator aids have an important function in the safe operation of the SDL and may come in many forms: complete or partial copies of procedures, system drawings, hand written notes, computer and TV displays. These postings must reflect the most current information and must not supersede or conflict with any procedure.

17.3 Guidelines

17.3.1 Operator Aid Development

Any SDL technical staff member may develop an operator aid. However, they must first be approved by the Operations Head before posting in the control area.

Help aids are developed by the Computer Systems Group, in consultation with the Operations Head, for the operations applications programs.

Equipment operating aids are developed by technical support groups and reviewed by the group supervisor or responsible engineer.

17.3.2 Approval

The Operations Head signs and dates operator aid postings in the SDL Control Area.

17.3.3 Postings

Operator aids are posted so they do not obscure instruments or controls. Aids are located near the area of their expected use.

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Computer "Help" programs are an integral part of the operations applications programs.

17.3.4 Use of Aids

Operator aids are used as a convenience and for supplementing approved procedures. They are not used to circumvent approved procedures.

Computer "Help" programs are for information purposes only and do not circumvent the application program.

17.3.5 Documentation

Operator aid postings are noted in the SDL operations log(s).

17.3.6 Review

During routine inspections of the facility, the Operations Head reviews operator aids to insure that they are accurate, current and necessary.

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EQUIPMENT PIPING AND LABELING 18

18.1 Introduction

A well established and maintained program for labeling equipment will help to insure that the SDL and support personnel can identify instrumentation, controls, and equipment. In addition, equipment labeling is required by Operational Safety and Health Administration (OSHA) regulations and various national consensus standards.

18.2 Discussion

A good labeling program, understood and maintained by operations and maintenance personnel, enhances the effectiveness of training. It also helps to reduce errors in operations and by maintenance personnel. Errors can result from incorrect identification of equipment and controls. A good labeling program is consistent with the NSLS's ALARA goals because the exposure of personnel to radiation and to hazardous materials is reduced if the operations staff spends less time identifying components.

The labeling program should allow personnel to identify instrumentation, controls and equipment needing labels. In addition to equipment, doors to rooms should be labeled to help SDL and support personnel to identify rooms, and if applicable, the equipment inside.

18.3 Guidelines

18.3.1 Components Requiring Labeling

All equipment built by SDL technical personnel is labeled according to existing laboratory conventions. Commercial built equipment is labeled by the manufacturer.

Emergency exits, fire alarms, fire extinguishers and fire protection equipment are labeled in a standard industrial format.

Circuit breaker panels are labeled so as to designate which circuit they are fed from and what devices they feed.

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Cable and wire runs are labeled at each end. Their function and destination are recorded in a cable directory.

Equipment racks are labeled and their location documented.

All electromagnets, together with their associated power supplies, are labeled with their appropriate mnemonic.

Water piping is labeled with its function and flow direction.

Also included in the facility labeling program are cabinets containing hazardous substances, controlled areas and room doors.

18.3.2 Label Information

Label information is consistent with the information found in SDL procedures, drawings and other documentation. Labels are permanently attached and have easy to read information.

18.3.3 Label Placement

Labels are placed on, or as near as practical, to the controls or equipment being labeled. Labels are oriented so they are easy to read.

18.3.4 Replacing Labels

The Operations Head is responsible for insuring that missing or damaged labels, once identified, are promptly replaced.

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NSLS REVISION & PERIODIC REVIEW LOG	
Document Number:	LS-SDL-0001
Subject:	Source Development Laboratory Conductor of Operation

> See NSLS Quality Control Coordinator for original revision and review signatures <

REVISION TABLE		
Rev	Description	Date
A	First Issue	12/15/1999
B.	Update the beam energy from 230 MeV to 300 MeV	7/18/06

PERIODIC REVIEW TABLE				Document Review Frequency
Complete this table to record the completion of periodic reviews for an existing controlled document. A successful periodic review will reveal the existing document is current, correct, and does not require any revision/change.				3 years
Rev	Date	Reviewed By (Print):	Signature:	